

WHAT IS CLAIMED IS:

1. A data relay unit for receiving and sending data frames through a communication line comprising:

a plurality of send/receive means for sending and receiving data frames, each of the data frame being received by a first send/receive means which is one of the send/receive means and sent by a second send/receive means which is another one of the send/receive means;

an identifier setting means for setting an identifier which is a predetermined portion of the data frame received by the first send/receive means to a value which represents that the identifier is set before the data frame is sent by the second send/receive means; and

a relay inhibiting means for checking whether the identifier of the data frame received by the first send/receive means is set and inhibiting the data frame from being sent by the second send/receive means if the identifier is set.

2. A data relay unit as in claim 1,

wherein a predetermined bit of a priority field of each data frame is assigned to the identifier as the predetermined portion of the data frame,

wherein the priority field holds a priority which represents a level of priority which the data frame has over other data frames when the data frame is sent over a communication line, and

wherein the identifier is defined so that the priority

of the data frame becomes higher when the identifier is set.

3. A multiplex communication system comprising:

a plurality of networks each of which comprises a communication line and a plurality of nodes connected to the communication line, the nodes communicating each other by exchanging data frames, a predetermined portion of each of the data frames being assigned to an identifier;

a data relay unit for relaying data frames among the networks, the data relay unit comprising:

a plurality of send/receive means for sending and receiving data frames, the communication lines of the networks being connected to the respective send/receive means, each of the data frames which is sent by a first node belonging to a first network to a second node belonging to a second network being received by the send/receive means connected to the communication line of the first network and sent by the send/receive means connected to the communication line of the second network, the first network being any one of the networks, the second network being another one of the networks, the identifier of the data frame being reset by the first node before the data frame is sent to the second node;

an identifier setting means for setting the identifier of the data frame received by the first send/receive means to a value which represents that the identifier is set before the data frame is sent by the second send/receive means; and

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a relay inhibiting means for checking whether the identifier of the data frame received by the first send/receive means is set and inhibiting the data frame to be sent by the second send/receive means if the identifier is set.s

4. A multiplex communication system as in claim 3,

wherein a third node receives a data frame from a forth node, the third node being any one of the nodes included in the networks, the fourth node being another one of the nodes included in the networks, the identifier of the data frame being reset by the fourth node before the data frame is sent to the third node, the third node comprising:

a first check means for checking whether the network which includes the forth node is the same as the network which includes the third node;

a second check means for checking whether the identifier of the data frame received from the fourth node is set; and

a verification means for receiving results of the checks from the first check means and the second check means and invalidating the received data frame if both the results are 'YES' or both the results are 'NO'.

5. A node for receiving a data frame from a sender node that is another node directly or via a data relay unit, the node comprising:

a first check means for checking whether the received data frame is a data frame which should not be relayed by the data

relay unit;

a second check means for checking whether the received data frame is actually relayed by the data relay unit when it is sent from the sender node to the node; and

a verification means for receiving results of the checks from the first check means and the second check means and invalidating the received data frame if both the results are 'YES' or both the results are 'NO'.

6. A method for preventing a data frame from being processed repeatedly in a multiplex communication system including a plurality of networks and a data relay unit, each network including at least one node, the method comprising the steps of:

resetting an identifier that is a predetermined portion of a data frame and sending the data frame from a first node to a second node;

receiving the data frame by the data relay unit if a first network which includes the first node is different from a second network which includes the second node;

checking by the data relay unit whether the identifier of the received data frame is set;

setting by the data relay unit the identifier of the received data frame and sending the data frame from the data relay unit to the second node if it is determined that the identifier of the data frame is not set; and

inhibiting the received data frame from being sent to the

second node by the data relay unit if it is determined that the identifier of the data frame is set.

7. A method as in claim 5,

wherein a predetermined bit of a priority field of each data frame is assigned to the identifier as the predetermined portion of the data frame,

wherein the priority field holds a priority which represents a level of priority which the data frame has over other data frames when the data frame is sent over a communication line, and

wherein the identifier is defined so that the priority of the data frame become higher when the identifier is set.

8. A method as in claim 5 further comprising the steps of:
receiving the data frame by the second node;

checking by the second node whether the first network is the same as the second network;

checking by the second node whether the identifier of the received data frame is set; and

invalidating the received data frame by the second node if both the results of the checks are 'YES' or both the results of the checks are 'NO'.